

SEM: EDR Temperature Summary

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1.0 Abstract

This document shows the processed flight data from the SEM Engineering Data Recorders (EDR). The SEM EDR is merely a standard Module Electronics Unit (MEU) flown in a passive module and executes a predetermined timeline to sample engineering data. Below is a composite and individual EDR temperature plots. EDRs are flown on most missions with active modules. Normally only one is flown, however, SEM-02 had two. In each mission since SEM-02 the temperature data is that recorded from the MEU thermistor. The temperature data from SEM-01 is from the Exper. # 0009 timeline. This document will be updated periodically to add subsequent missions.

2.0 Vital Statistics

| <i>Mission</i> | <i>Flight</i> | <i>Launch</i> | <i>Activation</i> | <i>SEM MET</i> | <i>EDR #</i> |
|-----------------------|----------------------|----------------------|--------------------------|-----------------------|---------------------|
| SEM-01 | STS-80 | 961119 | 01/23:52 | 340 Hours | Exper. #0009 |
| SEM-02 | STS-85 | 970801 | 01/00:09 | 231 Hours | 01, 02 |
| SEM-03 | STS-91 | 980603 | 00/03:53 | 63 Hours | 03 |
| SEM-04 | STS-95 | 981029 | 00/06:24 | 163 Hours | 04 |

3.0 MEU Analog Data Channels Summary

| <i>Ch.</i> | <i>Description</i> | <i>Sensor Used</i> | <i>Sample Rate</i> |
|-------------------|----------------------------------|---------------------------|---------------------------|
| 0 | Experiment Thermistor #1 | YSI-44006 thermistor | Every 5 minutes |
| 1 | Experiment Thermistor #2 | YSI-44006 thermistor | Every 5 minutes |
| 2 | Experiment Thermistor #3 | YSI-44006 thermistor | Every 5 minutes |
| 3 | Experiment Analog #1 (0 to +5 V) | | |
| 4 | Experiment Analog #2 (0 to +5 V) | | |
| 5 | Experiment Analog #3 (0 to +5 V) | | |
| 6 | Experiment Analog #4 (0 to +5 V) | | |
| 7 | Experiment Analog #5 (0 to +5 V) | | |
| 8 | Experiment Analog #6 (0 to +5 V) | | |
| 9 | Not Used (Connected to ground) | N/A | |
| 10 | Not Used (Connected to ground) | N/A | |
| 11 | Experiment Current | Internal shunt | |
| 12 | +12V Monitor (SEM Battery) | Internal volt. div. | Every 5 minutes |
| 13 | +5V MEU Power Supply | Internal volt. div. | |
| 14 | +5V Sensor Power (10 mA max.) | Internal volt. div. | |
| * 15 | MEU Thermistor (YSI 44006) | Internal thermistor | Every 5 minutes |

* = Channel sampled

4.0 Loading EDR Data

This file requires measured data files generated by the SEM software. This file must be in the same directory as the data files (Md_x.dat).

To generate the data files from scratch, first run the SEM software.

1. Load the EDR's Experiment Data File (EDF) and then the EDR's Measured Data File (MDF).
2. Run the MDF plot for each of the data channels of interest using the desired units.
3. The software will generate a text file for each data channel and will be named Md_x.txt (where 'x' is the channel number. These files must be renamed to a '.dat' file extension.
4. Make sure the files are in the same director as this file.
5. Edit the lines below to include and plot the desired channels.

5.0 Plotting Data

Enter the number of actual data samples. The numbers of recorded samples may differ from the EDF valves. This value can be determined with the MDF Analyzer.

The resolution of the plot may be adjusted by changing the value below. The resolution factor must be greater than 0. The larger the number the less points plotted. Less data points plot faster.

Each data set with is loaded individually. A data set includes the sample time stamp (in second of SEM MET) and the measure data (in the same units used when the data was plotted in the SEM software). After the data is read in, it is separated into two arrays; one for time and one for data. Since each channel can have a different sample rates the SEM METs need to be loaded for each channel.

5.1 SEM-01 Experiment #0009 Thermistor Input Channel #2

```
Samples_E9 := 4122      N_E9 := Samples_E9·3      iE9 := 0.. N_E9 - 1
Resolution_E9 := 10      R_E9 := Resolution_E9·3    jE9 := 0, R_E9 .. N_E9 - 1
EXP09_iE9 := READ( "Md_2_E9.dat" )
EXP09_T(iE9) := EXP09_iE9·sec
EXP_09(iE9) := EXP09_iE9 + 1
```

5.2 SEM-02 EDRs #01 & #02 MEU Thermistor Input Channels

```
Samples_01 := 2772      N_01 := Samples_01·3      i1 := 0.. N_01 - 1
Resolution_01 := 10      R_01 := Resolution_01·3    j1 := 0, R_01 .. N_01 - 1
EDR01_i1 := READ( "Md_15_01.dat" )
EDR01_T(i1) := EDR01_i1·sec
EDR_01(i1) := EDR01_i1 + 1

Samples_02 := 2772      N_02 := Samples_02·3      i2 := 0.. N_02 - 1
Resolution_02 := 10      R_02 := Resolution_02·3    j2 := 0, R_02 .. N_02 - 1
EDR02_i2 := READ( "Md_15_02.dat" )
EDR02_T(i2) := EDR02_i2·sec
EDR_02(i2) := EDR02_i2 + 1
```

5.3 SEM-03 EDR #03 MEU Thermistor Input Channel

```
Samples_03 := 751          N_03 := Samples_03·3          i3 := 0.. N_03 - 1
Resolution_03 := 5          R_03 := Resolution_03·3       j3 := 0, R_03.. N_03 - 1
EDR03i3 := READ( "Md_15_03.dat" )
EDR03_T(i3) := EDR02i3·sec
EDR_03(i3) := EDR03i3 + 1
```

5.4 SEM-04 EDR #04 MEU Thermistor Input Channel

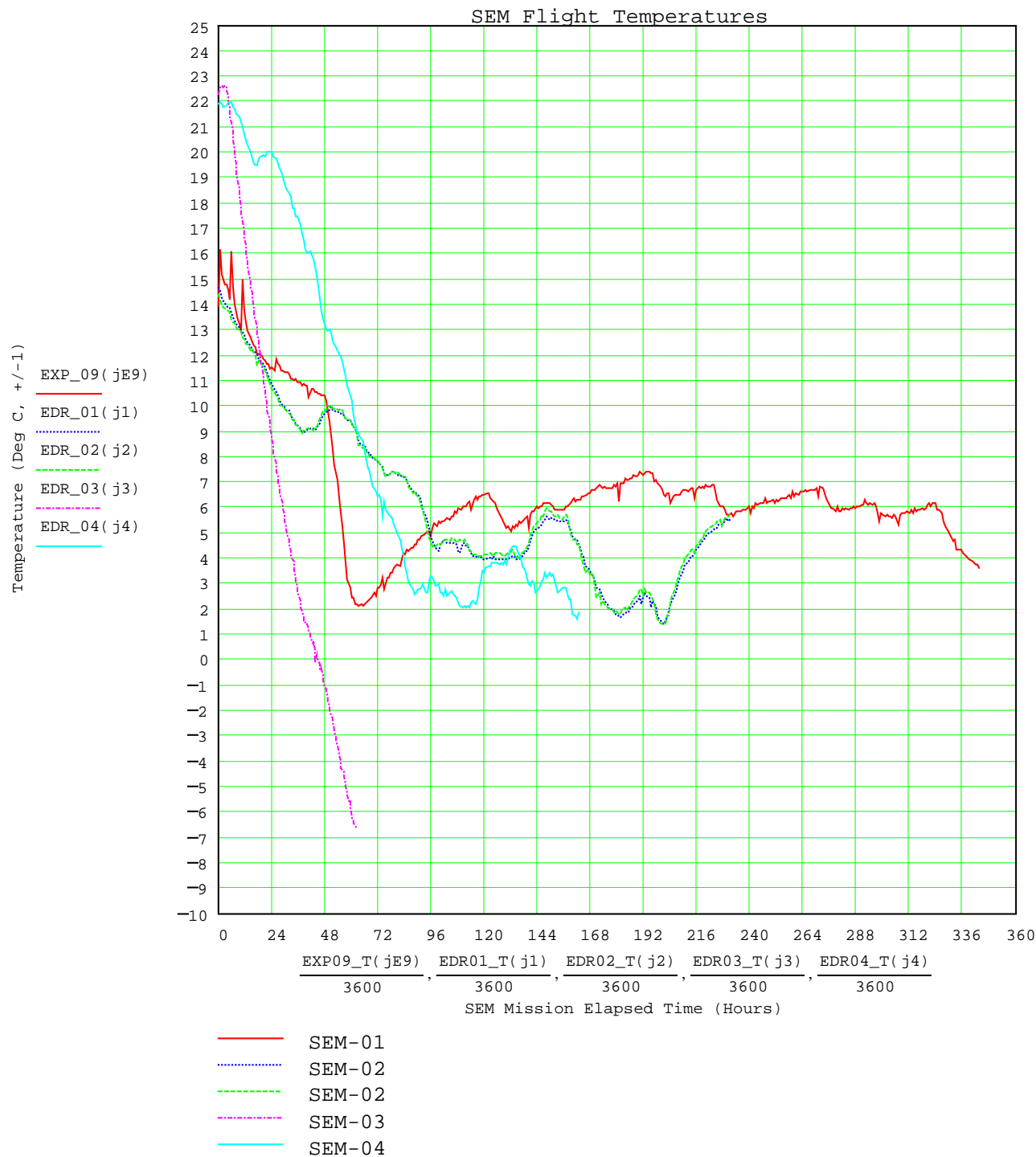
```
Samples_04 := 1958          N_04 := Samples_04·3          i4 := 0.. N_04 - 1
Resolution_04 := 10          R_04 := Resolution_04·3       j4 := 0, R_04.. N_04 - 1
EDR04i4 := READ( "Md_15_04.dat" )
EDR04_T(i4) := EDR04i4·sec
EDR_04(i4) := EDR04i4 + 1
```

6.0 Thermal Data

This section shows the temperatures of various SEM missions as recorded by the EDRs. In each case the data is from the thermistor located on the EDR itself.

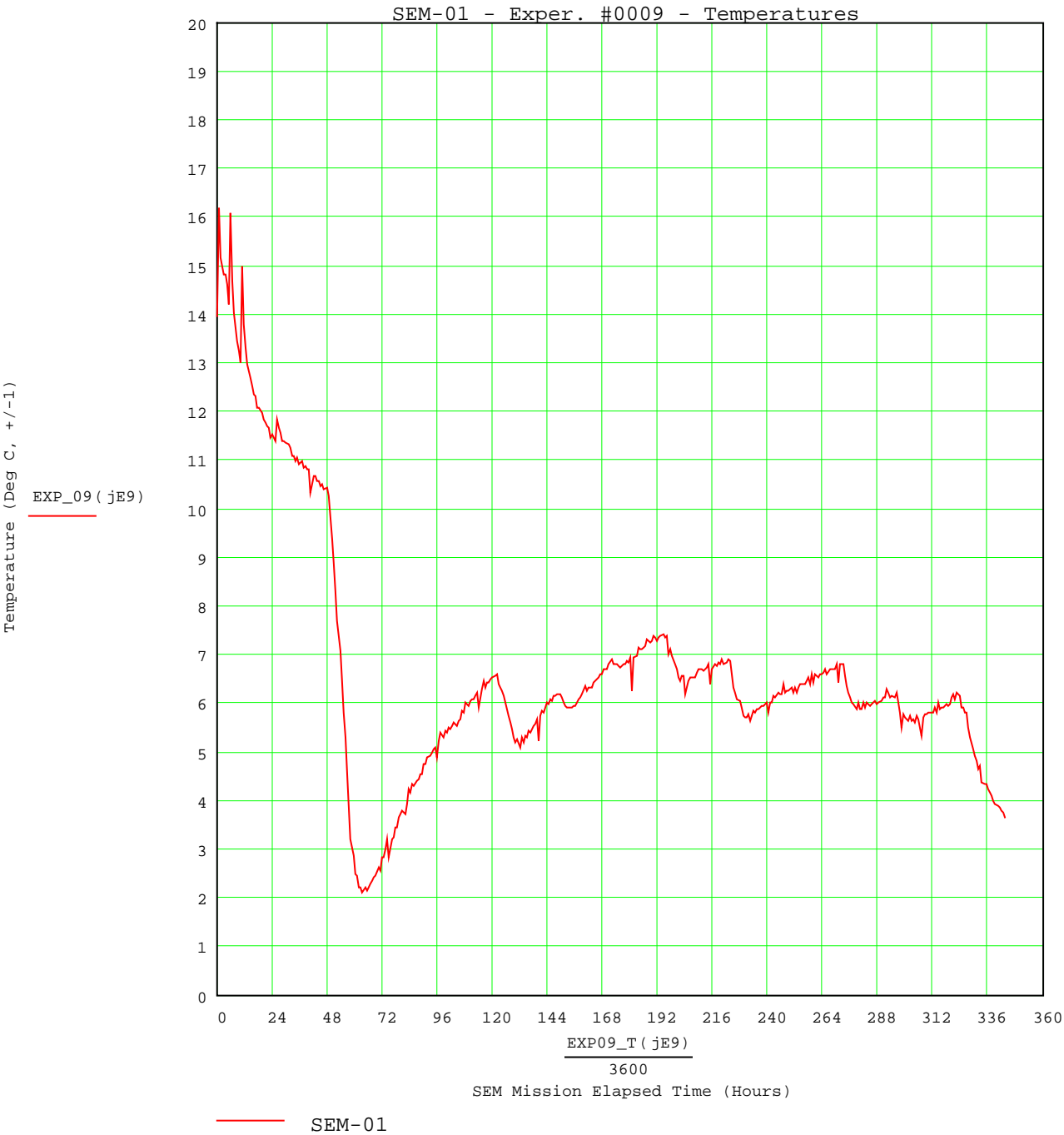
6.1 Composite Flight Temperature Plot

This medium resolution plot overlays data from the two thermistors placed around the payload and the MEU thermistor. Due to component tolerances the error is approximately ± 1 deg C.



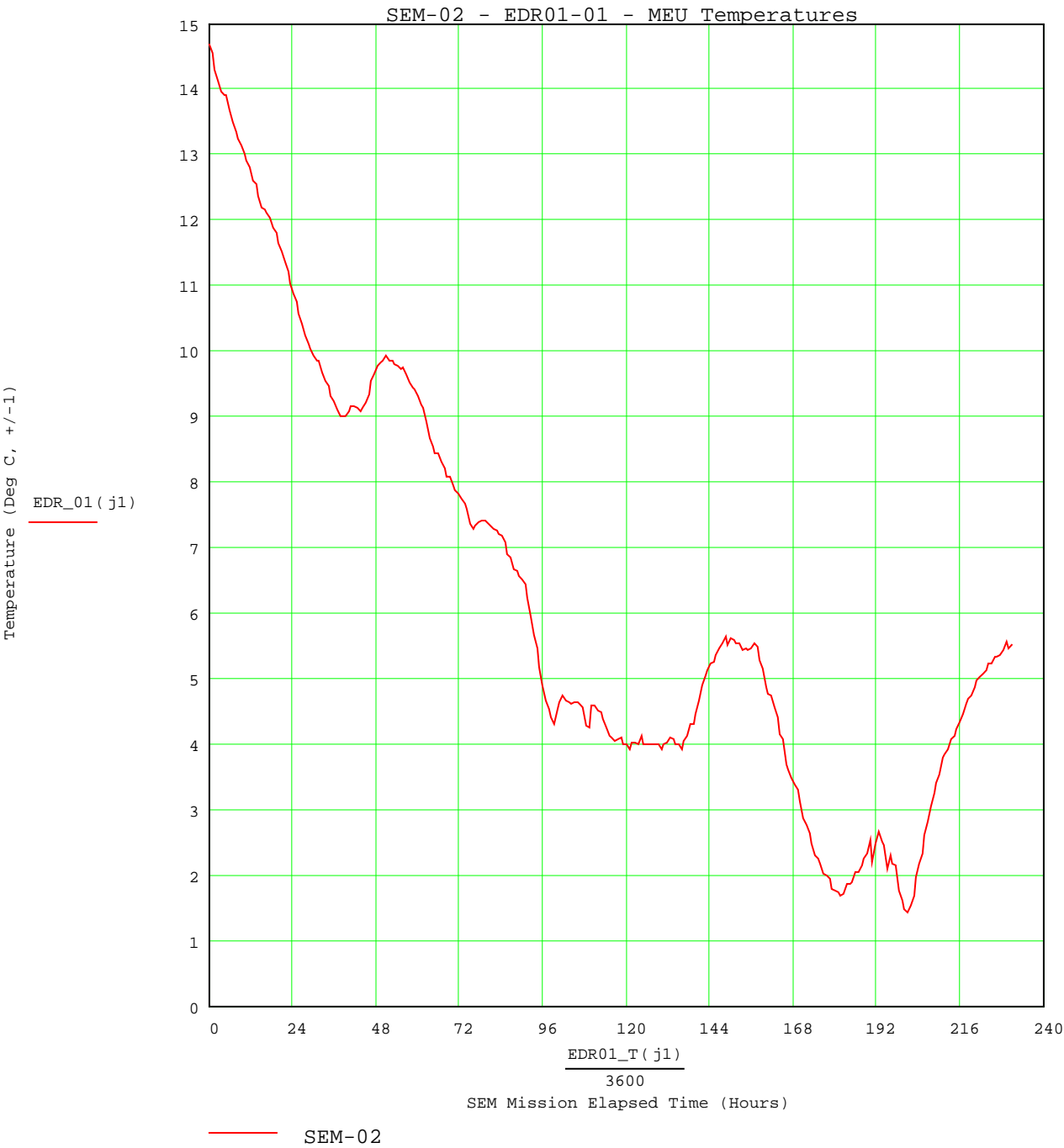
6.2 SEM-01 Experiment #0009 Temperature Plot

This high-resolution plot is of the thermistor located within Exper. #0009. Due to component tolerances the error is approximately +/-1 deg C. The spikes at the beginning of the plot are a result of the operation of the experiment apparatus.



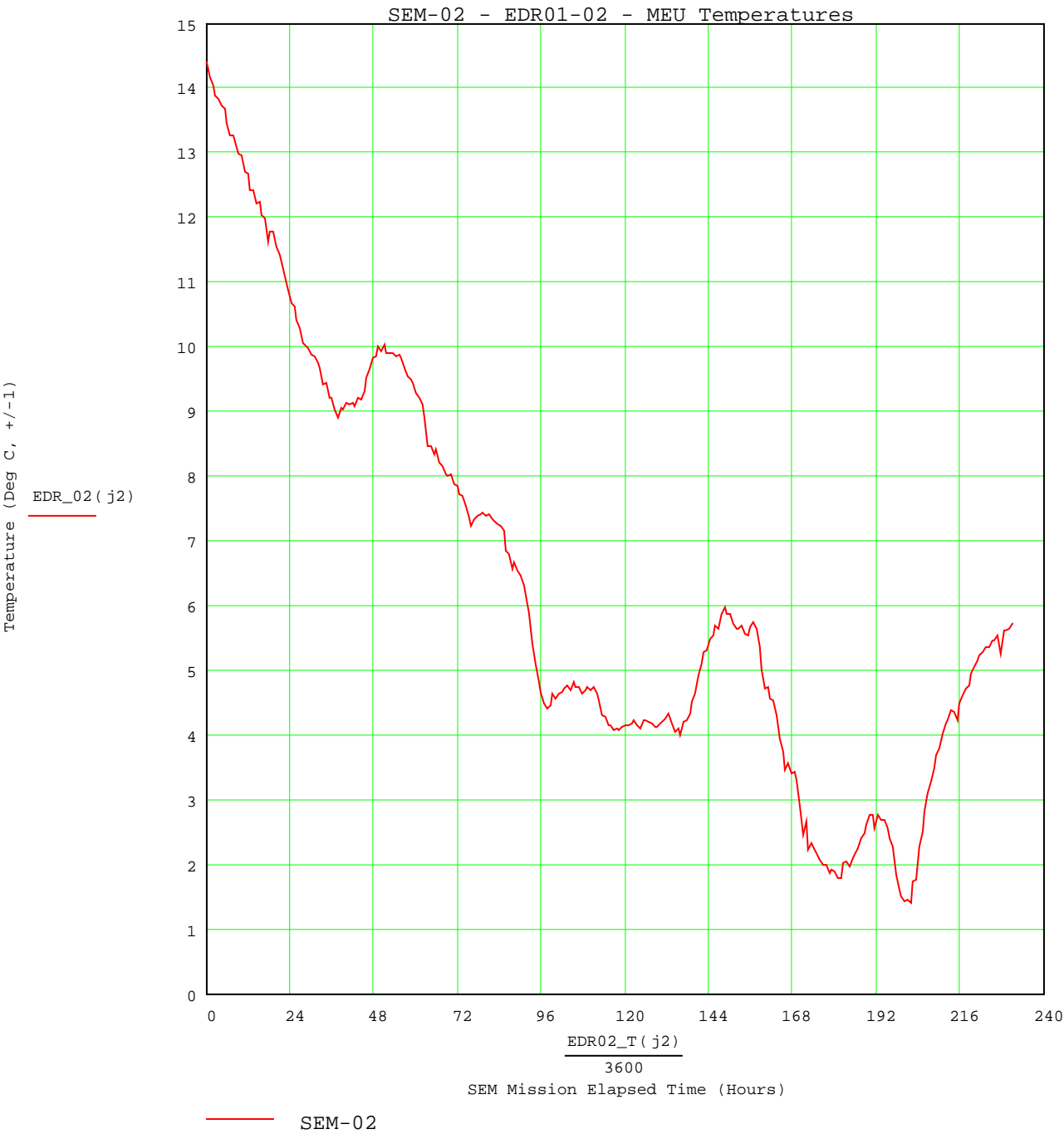
6.3 SEM-02 EDR #01 MEU Temperature Plot

This high-resolution plot is of the thermistor located on the MEU itself. Due to component tolerances the error is approximately +/-1 deg C.



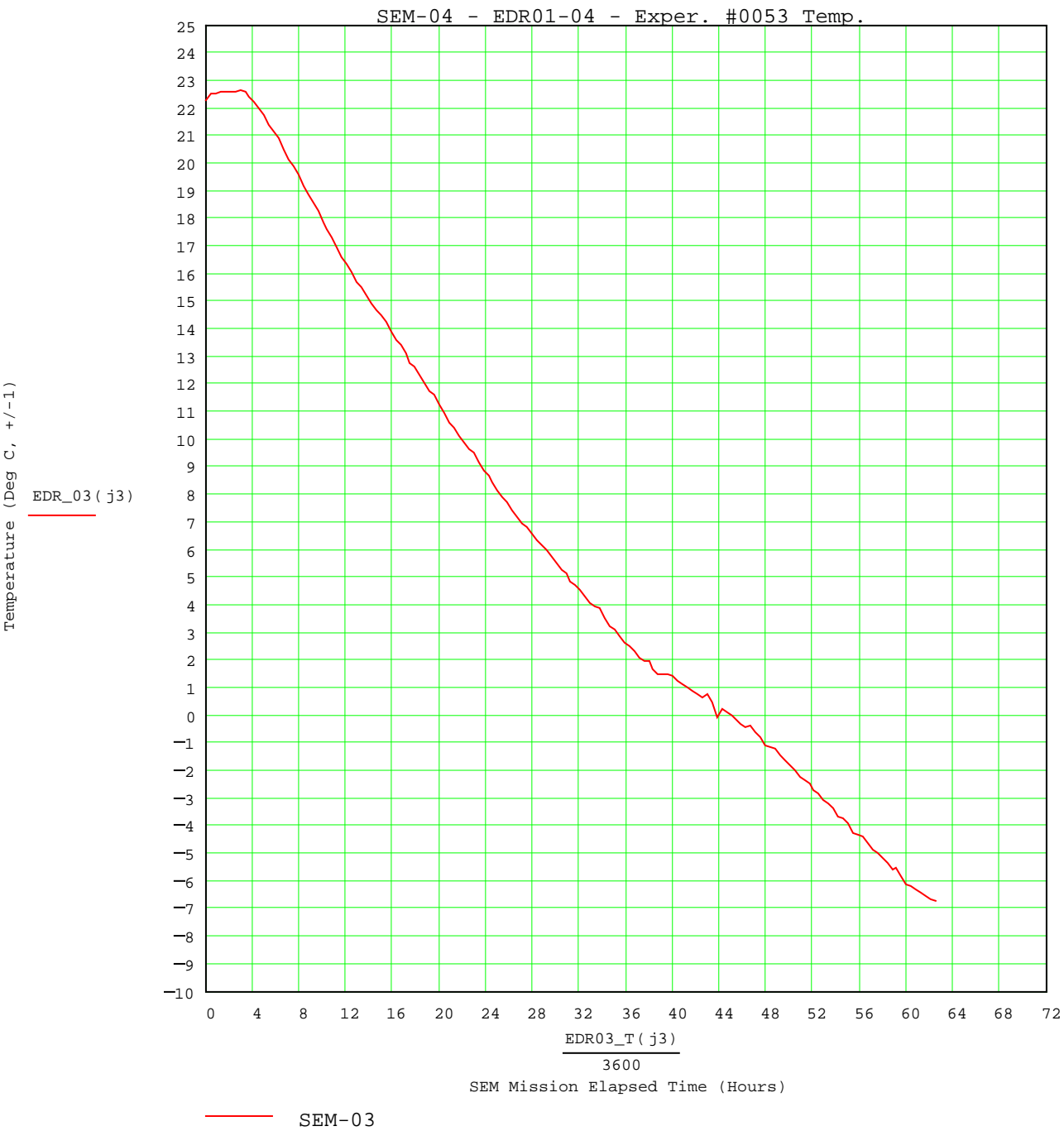
6.4 SEM-02 EDR #02 MEU Temperature Plot

This high-resolution plot is of the thermistor located on the MEU itself. Due to component tolerances the error is approximately +/-1 deg C.



6.5 SEM-03 EDR #03 MEU Temperature Plot

This high-resolution plot is of the thermistor located on the MEU itself. Due to component tolerances the error is approximately +/-1 deg C.



6.6 SEM-04 EDR #04 MEU Temperature Plot

This high-resolution plot is of the thermistor located on the MEU itself. Due to component tolerances the error is approximately +/-1 deg C.

